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A REVIEW OF THE SUBGENUS *TRICHOPYGOMYIA* BARRETTO, 1962; WITH DESCRIPTION OF A NEW SPECIES FROM THE BRAZILIAN AMAZON BASIN (DIPTERA: PSYCHODIDAE, PHLEBOTOMINAE)

JORGE R. ARIAS*
PAUL D. READY**
RUI A. DE FREITAS*

The subgenus Trichopygomyia *Barretto, 1962 of the phlebotomine genus* Lutzomyia *França, 1924 is reviewed. This subgenus corresponds to the informal species group* longispina *of Theodor (1965).* Lutzomyia (Trichopygomyia) ratcliffei *n. sp. from the Brazilian Amazon Basin is described. Figures, keys, distribution maps and notes on ecology are presented for all the known forms. The better known species are most frequently encountered in armadillo burrows and, therefore, could well be vectors of* Leishmania.

CLASSIFICATION

Genus *Lutzomyia* França, 1924 (sensu Theodor, 1948, 1965).

Subgenus *Trichopygomyia* Barretto, 1962.

Antennal ascoids simple (i.e. without hind spurs) and long. Fifth palpal segment as long as, or longer than, the combined length of segments 3 and 4. *Male:* Style (= dististylus) not forked, bearing four major spines inserted at different levels and a subterminal seta. Coxite (= basistylus) without a median or basal discrete tuft of setae but with a narrow row of long, semideciduous setae along its ventral margin. Paramere bifurcate or trifurcate. Aedeagus large. Lateral lobe not swollen and as long as coxite. *Female:* Body of spermatheca ovoid (or pear shaped), finely striated, with a prominent terminal knob (or "head"); individual spermathecal duct distinct, often long; common spermathecal duct long, short or absent. Cibarium (= buccal cavity) typically with 4 horizontal teeth and one or two rows of small vertical (= fore) teeth; cibarial arch complete or nearly so; pigment patch often weakly marked. *Egg:* with polygonal pattern on exochorion. *Larvae:* antennae not on prominent tubercles; 1st instar with 2 caudal setae, 2nd to 4th instars with 4.

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*Instituto Nacional de Pesquisas da Amazônia, Caixa Postal 478, 69000, Manaus, Amazonas, Brazil.

**Wellcome Parasitology Unit, Caixa Postal 3, 66000, Belém, Pará, Brazil.

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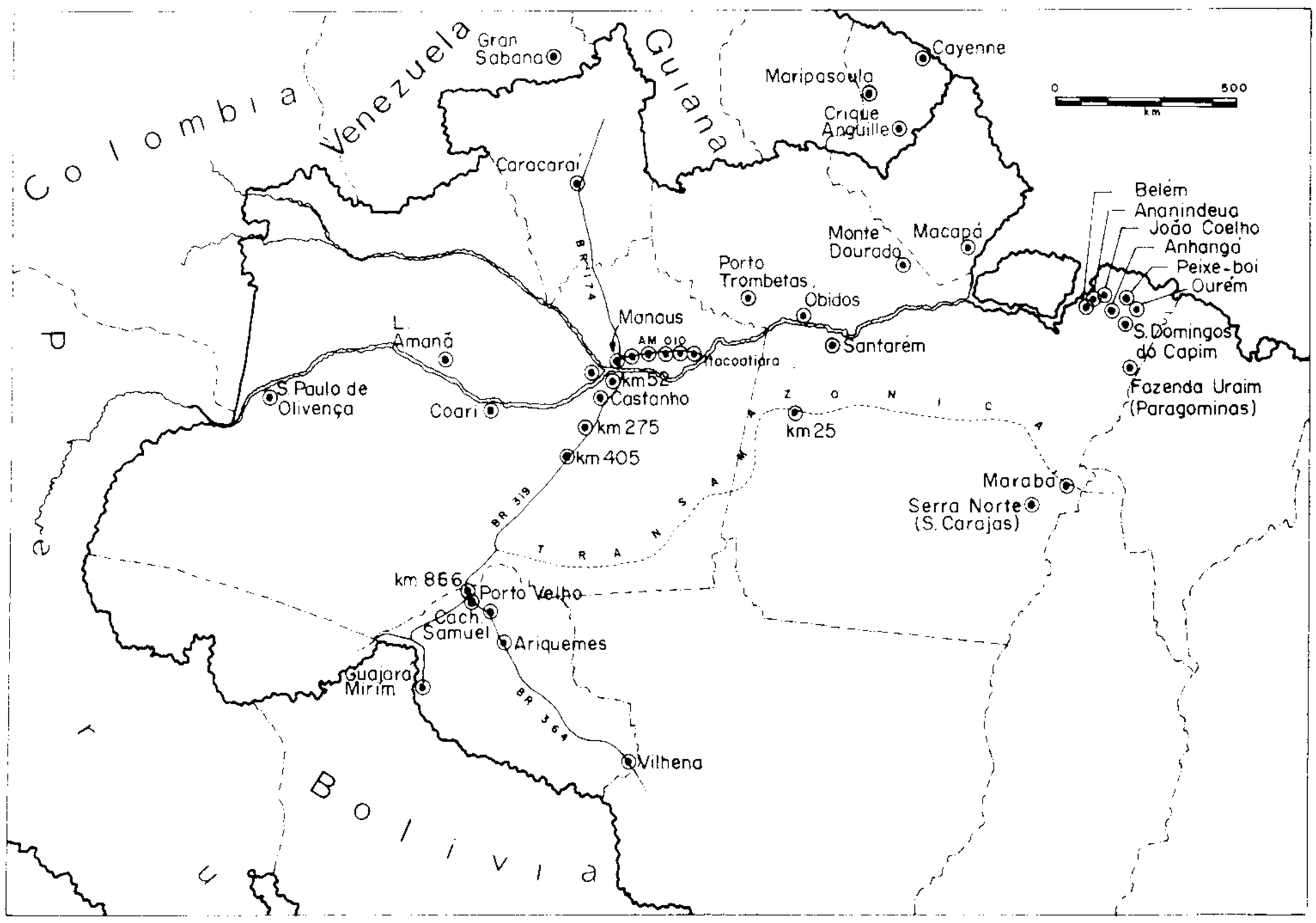
Barretto (1962) created *Trichopygomyia* as a subgenus of *Lutzomyia,* with *Flebotomus longispinus* Mangabeira, 1942 as its type species. Of the species listed by Barretto (1962), *Lutzomyia dasipodogeton* (Castro), *L. longispina* (Mangabeira), *L. trichopyga* (Floch & Abonnenc), *L. triramula* (Fairchild & Hertig) and *L. wagleyi* (Causey & Damasceno) constitute a "natural" group, in that the adults of each sex share a combination of morphological characters which separates them from other neotropical sand flies; *Lutzomyia (Lutzomyia) lichyi* (Floch & Abonnenc, 1950), the sixth species listed by Barretto (1962), is clearly different (the male has two foliaceous setae on a coxite tubercle; the female has annulate spermathecae). Fairchild & Hertig (1952) were the first to associate the aforementioned five species, which Fairchild (1955) later classified as the informal species group *longispinus.* The advantages of using informal sub-generic groups for the genus *Lutzomyia* sensu lato have been further advocated by Theodor (1965), Lewis et al. (1977) and Young (1979), all of whom recognized Fairchild's species group as *longispina.* Martins and colleagues, however, accepted Barretto's formal subgeneric ranking (Martins et al., 1963, 1965, 1976, 1978; Ramirez-Perez et al., 1976).

The failure to formalize groups of neotropical phlebotomine sand flies has hindered information retrieval and communication to such a degree that Forattini (1971, 1973) felt obliged to propose a radical, and admittedly artificial, classification in which the subgenus *Trichopygomyia* contained 37 species of very variable adult morphology. In our opinion, wherever possible, formal genus-group names should be adopted in order to aid communication and to maintain the integrity of long-recognized "natural" groups (see Ready et al., 1981). Thus, the subgenus considered here is *Trichopygomyia* sensu stricto, following the definitions of Barretto (1962) and Martins et al. (1978).



Map. 1 – Northern Brazil and neighbouring countries showing localities cited as collection records for the various sand fly species in the subgenus *Trichopygomyia.*

The new species described in this paper brings the total in the subgenus to nine; *L. rondoniensis* Martins, Falcão & Silva, *L. elegans* Martins, Llanos & Silva and *L. conviti* Ramirez-Perez, Martins & Perez were added to the original group by their describers. *Lutzomyia triramula* is the only *trans*-Andean species, having been recorded from non Amazonian Colombia to Belize; the other eight species are known only from east of the

Andes (*cis*-Andean), all occurring in or near the Amazon Basin (six have been captured in the Brazilian Amazon region). All measurements are in mm.

Lutzomyia conviti Ramirez-Perez, Martins & Perez, 1976
(Fig. 1)

Lutzomyia conviti Ramirez-Perez, Martins & Ramirez, 1976 (♂♀ described from Venezuela).

Distribution. Venezuela – Amazonas: Ocamo

Material Examined. None

Discussion. This species closely resembles *Lutzomyia rondoniensis* and could possibly be conspecific. Unfortunately, we were not able to examine any specimens and the original description and illustrations could fit some of our *L. rondoniensis.* More collections in both the Venezuelan and Brazilian Amazon will probably clarify its status. The difference in the forms of the aedeagus does separate these two species, and at least for the present, we treat them as distinct species.

Lutzomyia dasipodogeton (Castro, 1939)
(Fig. 2; map 2)

Flebotomus dasipodogeton Castro, 1939: 4 (♂ described from Abaeté, Pará, Brazil). Mangabeira, 1942a:189 (cf. to *longispinus*).

Phlebotomus dasipodogeton: Floch & Abonnenc, 1945: 3 (cf. to *trichopygus*). Floch & Abonnenc, 1952:33 (keyed). Fairchild & Hertig, 1952:518 (cf. to *triramulus*). Fairchild, 1955:195 (classified).

Lutzomyia dasipodogeton: Forattini, 1971:102 (classified). Forattini, 1973: 303 *et. seq.* (gen. review, figs.). Martins et al., 1978: 114 (listed, distribution).

Lutzomyia dasypodogeton (sic): Barretto, 1962: 98 (classified). Martins et al. 1965: 14 (cf. to *rondoniensis*). Theodor, 1965: 190 (classified). Lewis, 1975: 502 *et seq.* (mouthpart morph.). Ramirez-Perez et al., 1976:601 (cf. to *conviti*). Martins et al., 1983: (redescribed).

Distribution. Brazil – *Amazonas State:* AM-010 (Manaus – Itacoatiara) Kms 133 & 246, 2 ♂♂ in CDC light traps 14-III-79, (Arias et al. coll); BR-319 (Manaus-Porto Velho) Kms. 52 & 102, 5 ♂♂ in CDC light traps, various dates 1980-81 (Ibid). *Pará State:* Ananindêua, 124 ♂♂ in animal burrows (most) and on tree trunks, various dates 1942-45 (Damasceno et al., 1949:823, 840); Anhanga, 810 ♂♂ same information (Ibid). Belém, 4,149 ♂♂ same information (Ibid); João Coelho, 50 ♂♂ same information (Ibid); Ourém, 2,238 ♂♂ same information (Ibid); Peixe Boi, 177 ♂♂ same information (Ibid); Santarém, 45 ♂♂, same information (Ibid); São Domingo do Capim, 2,100 ♂♂, same information (Ibid); Fazenda Uraim (130 Km east of Paragominas), 6 ♂♂ in CDC light traps, April 1981 (P.D. Ready coll.); Itaituba-Altamira Km 25, 13 ♂♂, 8 ♀♀ in an armadillo burrow, November 1971 (R.D. Ward coll.); near Monte Dourado, 1 ♂ on tree trunk, November 1975 (R.D. Ward coll.); Serra Norte, Serra dos Carajás, 2 ♂♂ from rodent-baited Disney trap (Ward et al., 1973:178), ♂♂♀♀ very abundant in CDC light traps, in armadillo burrows and on forest floor at altitudes 200-600m above sea level, various dates 1982 (P.D. Ready coll.). *Rondônia State:* BR-319 (Manaus-Porto Velho) Km 866 on west bank of Rio Madeira, ♂♂ frequent in CDC light traps, various dates 1980-81 (Biancardi et al., 1982:168 *et seq.*); BR-316 (Porto Velho-Vilhena) Kms 8, 19, 48, 62, 181, & Vilhena, ♂♂ frequent in CDC light traps (Ibid). *Roraima Federal Territory:* Caracaraí, 2 ♂♂ [on tree trunks] December 1960 (Martins et al., 1963:334).

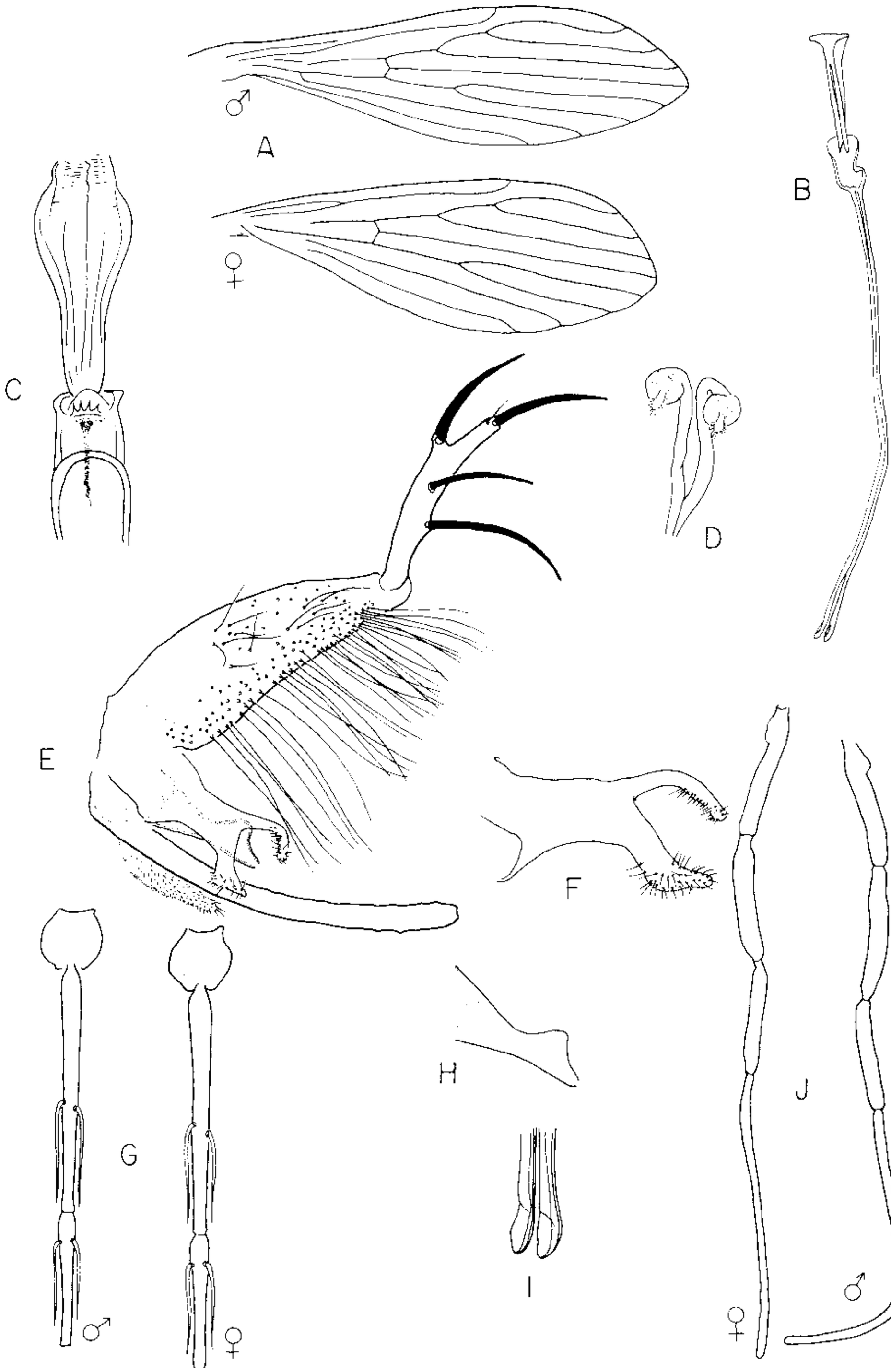
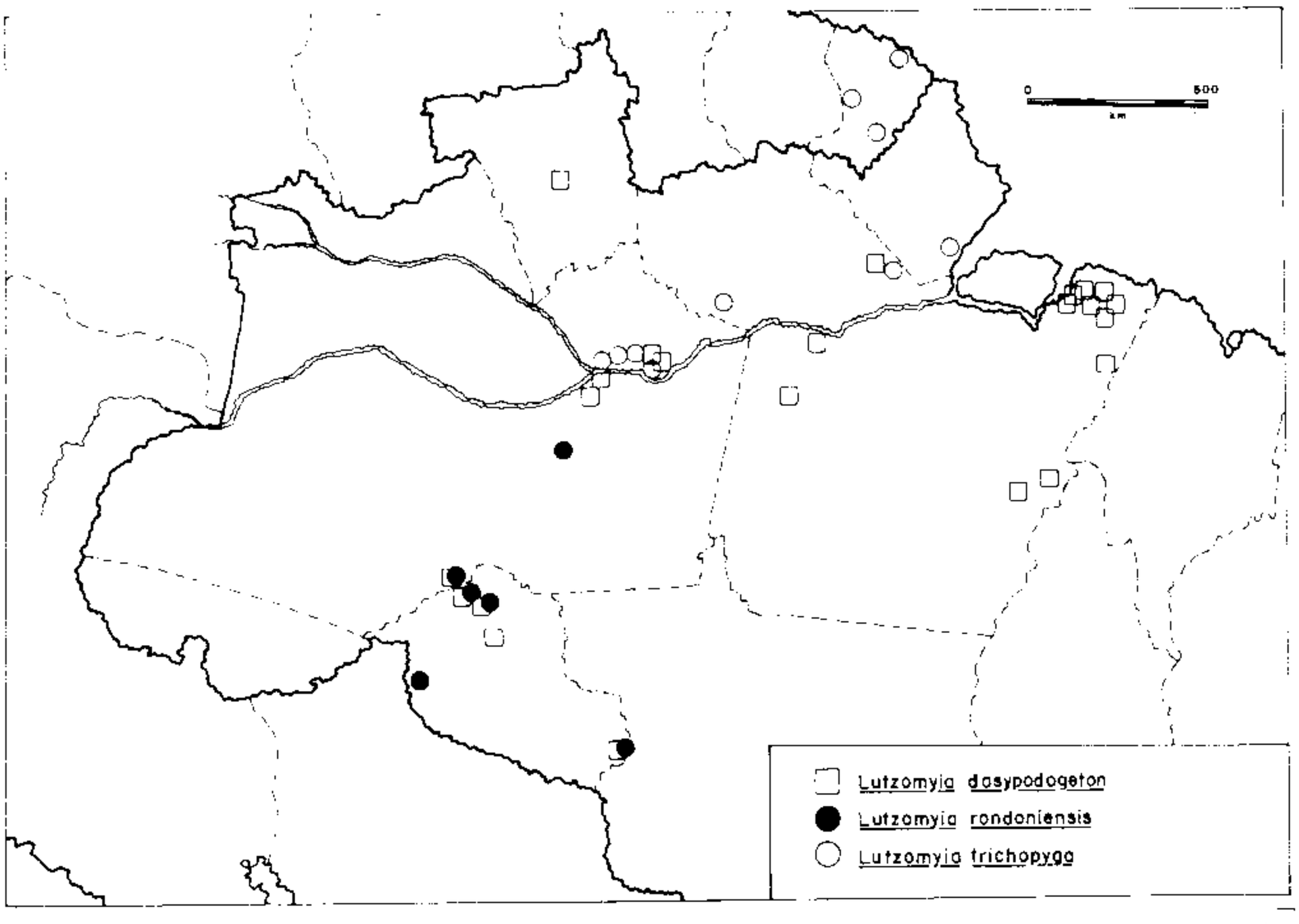


Fig. 1 – *Lutzomyia conviti:* A, wings; B, genital pump with filaments; C, ♀ cibarium and pharynx; D, spermathecae with ducts; E, ♂ genitalia; F, paramere; G, bases of antennae; H, aedeagus; I, genital filament tips and J, palps. (all after Ramirez-Perez et al., 1976).



Map. 2 – Known geographical distribution of *Lutzomyia dasipodogeton*, *L. trichopyga* and *L. rondoniensis*.

Material examined. Over 100 ♂♂ from the various localities in Amazonas and Rondônia States. On various occasions during the period June – October 1982, large numbers (50 + of each sex) of this species were taken from CDC light traps set at different altitudes (200-600m a.s.l.) in the region of Serra Norte, Pará State. No other *Trychopygomyia* forms were captured at the same times, thereby allowing us to associate the sexes of *L. dasipodogeton*.

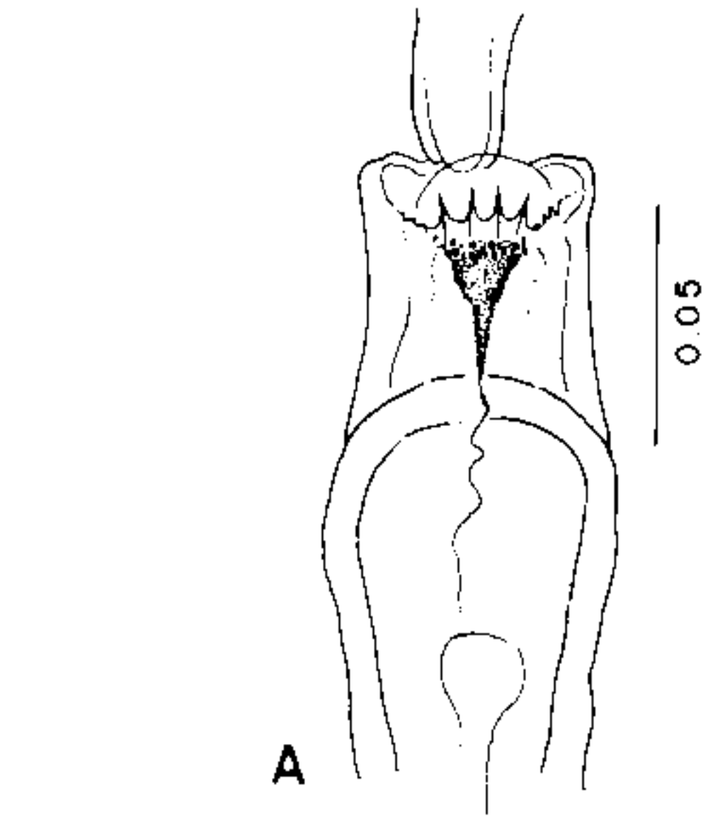
Lutzomyia elegans Martins, Llanos & Silva, 1976
(Fig. 3)

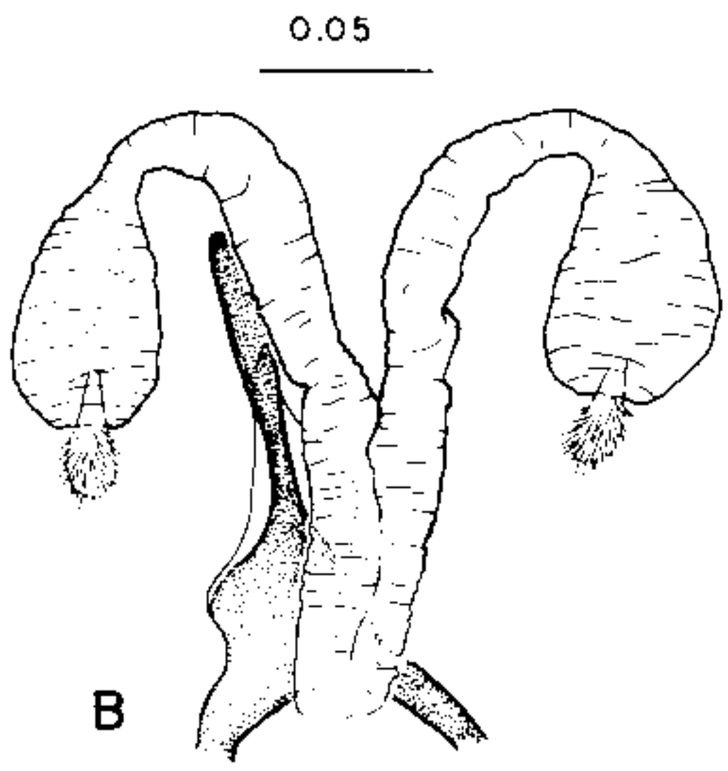
Lutzomyia elegans Martins, Llanos & Silva, 1976 (♂, ♀ described from Cachicoto, Huanuco, Peru). Martins et al., 1978): 114 (listed, distribution).

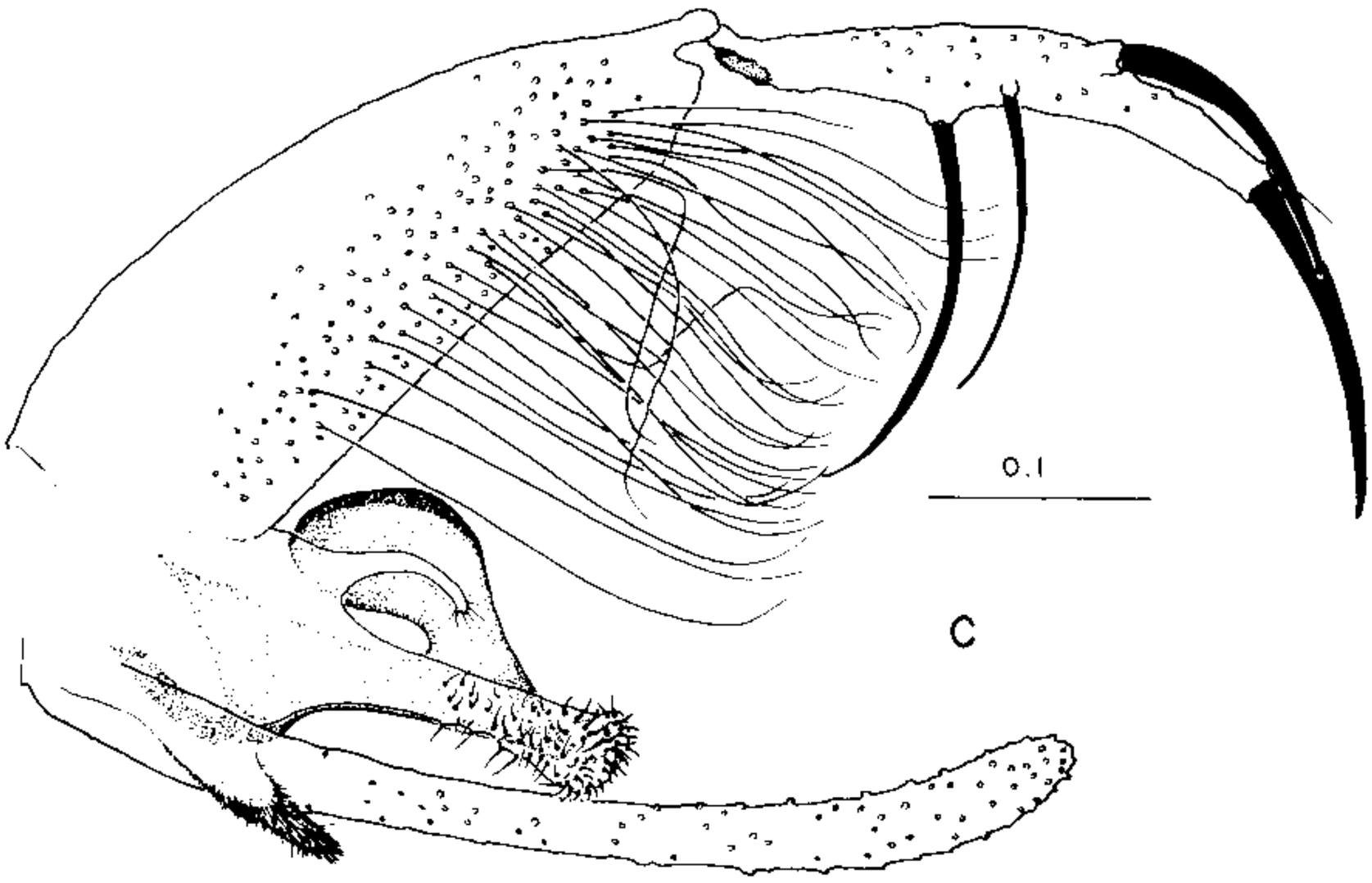
Distribution. Peru – Huanuco, Cachicoto, 124 ♂♂ 20 ♀♀ in animal burrows (Martins et al., 1976).

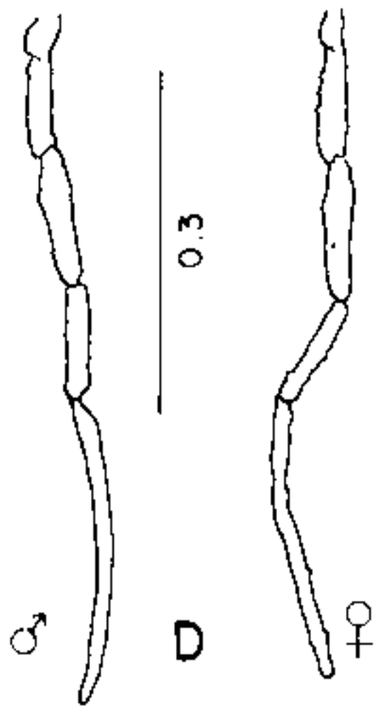
Material examined. 1 ♂ (Paratype) Cachicoto, Huanuco, (Peru) 14.7.73, A.V. Martins (slide nº 47.611 NE nº 01943/73). 1 ♀ Cachicoto, Huanuco (Peru) 14.7.73, J. Evangelista da Silva & Bertha Llanos coll. (slide nº 1565 and 1363). 1 ♀ (paratype) same locality and date A.V. Martins coll. (slide nº 47.684, NE nº 1943/73).

Discussion. This species is known only from Peru but may occur in the western most part of the Brazilian Amazon, near the Andes. It has not been taken with any other species in this subgenus. *L. elegans* is most closely related to *Lutzomyia triramula* which occurs in the western part of Colombia, but not in Brazil. Both species are easily separated from other *Trichopygomyia* males by their trifurcated parameres, the dorsal arms of which are subcylindrical and bear a distal tuft of curved setae. Males of these two species are separated from each other by the structure of the paramere (cf. Fig. 3 & Fig. 9).









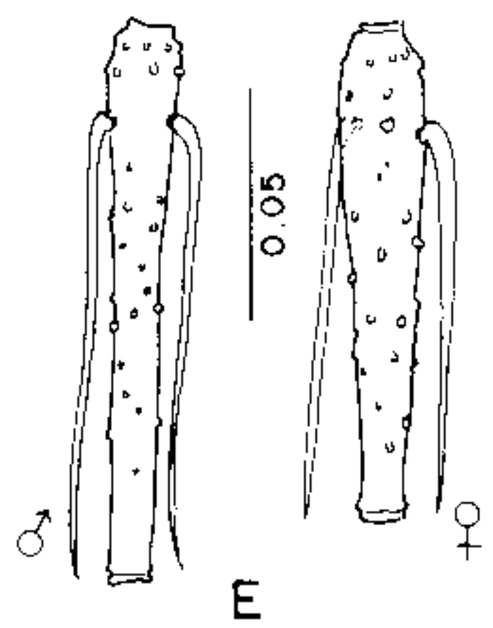


Fig. 2 — *Lutzomyia dasipodogeton*: A, ♀ cibarium; B, spermathecae with ducts; C, ♂ genitalia; D, palps; E, II flagellomere; F, genital pump with filaments.

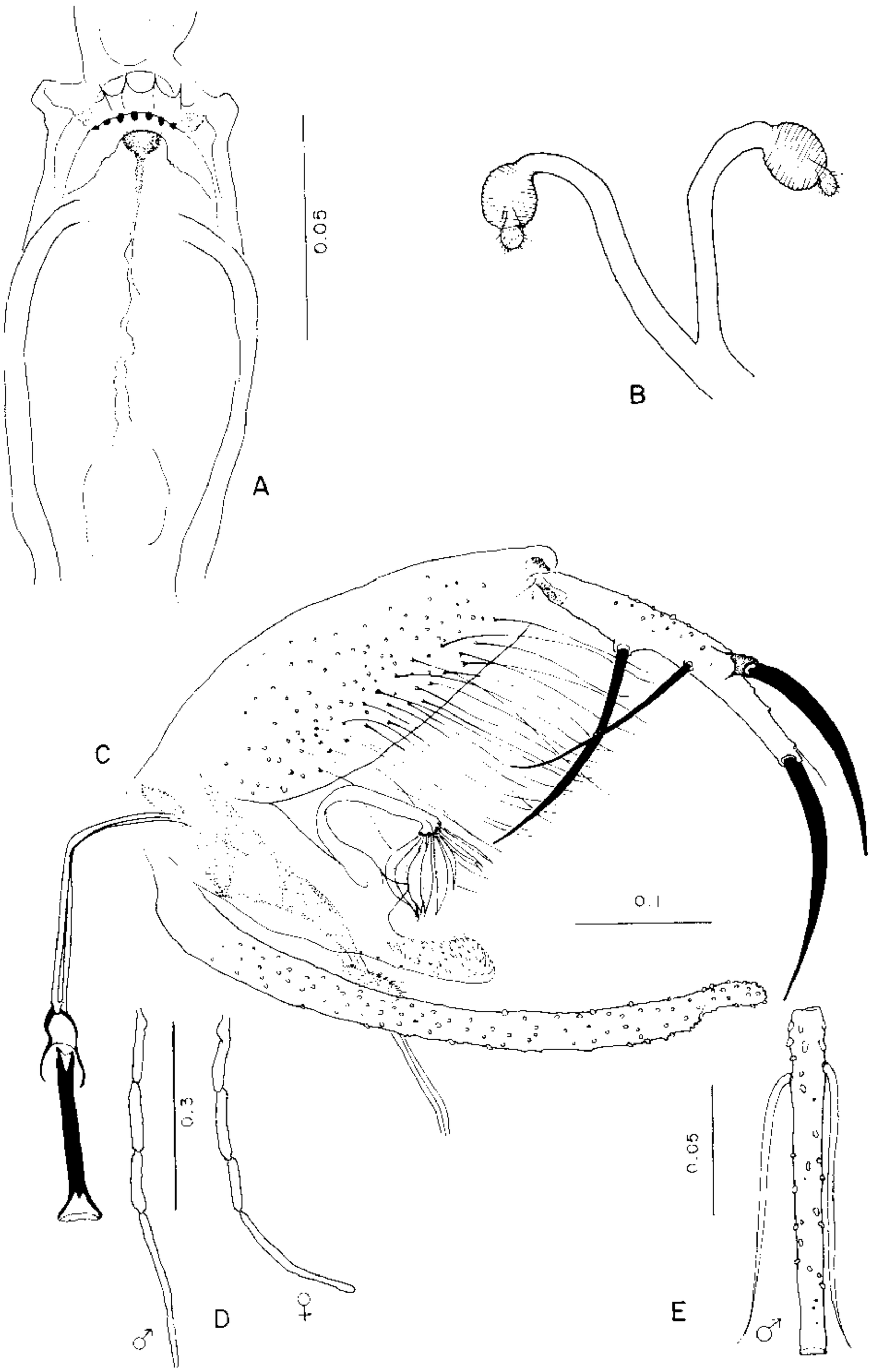


Fig. 3 – *Lutzomyia elegans:* A, ♀ cibarium; B, spermathecae with ducts (after Martins et al., 1975); C, male genitalia; D, palps; E, flagellomere II.

Lutzomyia longispina (Mangabeira, 1942)
(Fig. 4 & 5; map 3)

Flebotomus longispinus Mangabeira, 1942a. 186-189 (♂ holotype described from Aurá, Belém, Pará). Mangabeira, 1942b: 251 *et seq.* (♀, egg and larvae described). Causey & Damasceno, 1945a: 29 (cf. to *wagleyi*).

Phlebotomus longispinus: Floch & Abonnenc, 1945: 3 (cf. to *trichopygus*). Vargas & Diaz-Najera, 1951: 22 (cf. to *pratti*). Floch & Abonnenc, 1952: 48 (♂♀ keyed). Fairchild & Hertig, 1952: 518 (cf. to *triramulus*). Fairchild, 1955: 195 (classified). Pifano et al., 1962: 385, 389 (♂♀ keyed). Hanson, 1968: 88 (larva cf. to *triramulus*).

Lutzomyia longispina: Barretto, 1962 (classified). Martins et al., 1965: 14 (cf. to *rondoniensis*). Theodor, 1965: 190 (classified, ♂♀ figs.). Forattini 1971: 101-102 (classified). Forattini, 1973: 309 *et seq.* (gen. review, figs.). Lewis, 1975: 502 *et seq.* (mouthpart morph.). Martins et al., 1976: 491 (cf. to *elegans*). Ramirez-Perez et al., 1976: 602 (cf. to *conviti*). Léger et al., 1977: 218, 224 (♀ fig., Fr. Guiana). Martins et al., 1978: 114 (listed, distribution). Young, 1979: 121-123 (listed, distribution, ♂♀ figs., cf. to *triramula* in Colombia).

Distribution. [Colombia – Caqueta Department: San Miguel, 1 ♀ in tree hole (Osorno et al., 1972: 57)].* [Venezuela – *Bolivar State:* Gran Sabana (Pifano & Ortiz, 1952:142)]. Brazil – *Amazonas State:* Coari, 15 ♂♂ in animal burrows (most) and on tree trunks, various date 1942-45 (Damasceno et al., 1949: 827-841); Manacapuru, 698 ♂♂, same information (Ibid); Parintins, 3,254 ♂♂, same information (Ibid); Lago Amaná (Tefé area), 1,500 + ♂♂ 1,200 + ♀♀ in CDC light traps at forest floor level, April 1981 (J.R. Arias et al. coll); BR-319 (Manaus – Porto Velho) kms. 52 & 100, 39 ♂♂ in CDC light traps and on tree bases, various dates 1979-80 (Ibid). *Bahia State:* Cacheira, ♂♂ in armadillo burrow (Sherlock & Pessoa, 1964: 333). [*Minas Gerais State:* Marlieria, from Martins et al. 1978]. *Pará State:* Aurá, 630 ♂♂ in armadillo burrows (Mangabeira, 1942a: 189); Anhanga, 40 ♂♂ in animal burrows (most) and on tree trunks, various dates 1942-45 (Damasceno et al., 1949: 827); Belém, 37,967 ♂♂, same information (Ibid); João Coelho, 74 ♂♂, same information (Ibid), Óbidos, 5 ♂♂, same information (Ibid); Santarém, 17 ♂♂ same information (Ibid); São Domingos do Capim, 1 ♂, same information (Ibid); Utinga (Belém), 662 ♂♂ 132 ♀♀ from armadillo burrow(s), 1970-74 (R.D. Ward coll). [*Pernambuco State:* Igaraçú, from Martins et al., 1978]. *Rondônia State:* BR-319 (Manaus – Porto Velho) km 866, 7 ♂♂ in CDC light trap on west bank of Rio Madeira (Biancardi et al., 1982:172). [French Guiana – near Cayenne, 1 ♀ (Léger et al., 1977; 218, 224); Maripasoula, 4 ♀♀ (Ibid)].

Material examined. All ♂♂ from BR-319 and 1,000 + ♂♂& ♀♀ from Lago Amanã. Drawing of female based on female caught in same traps as the Lago Amanã males; no other *Trichopygomyia* forms were taken in the same locality.

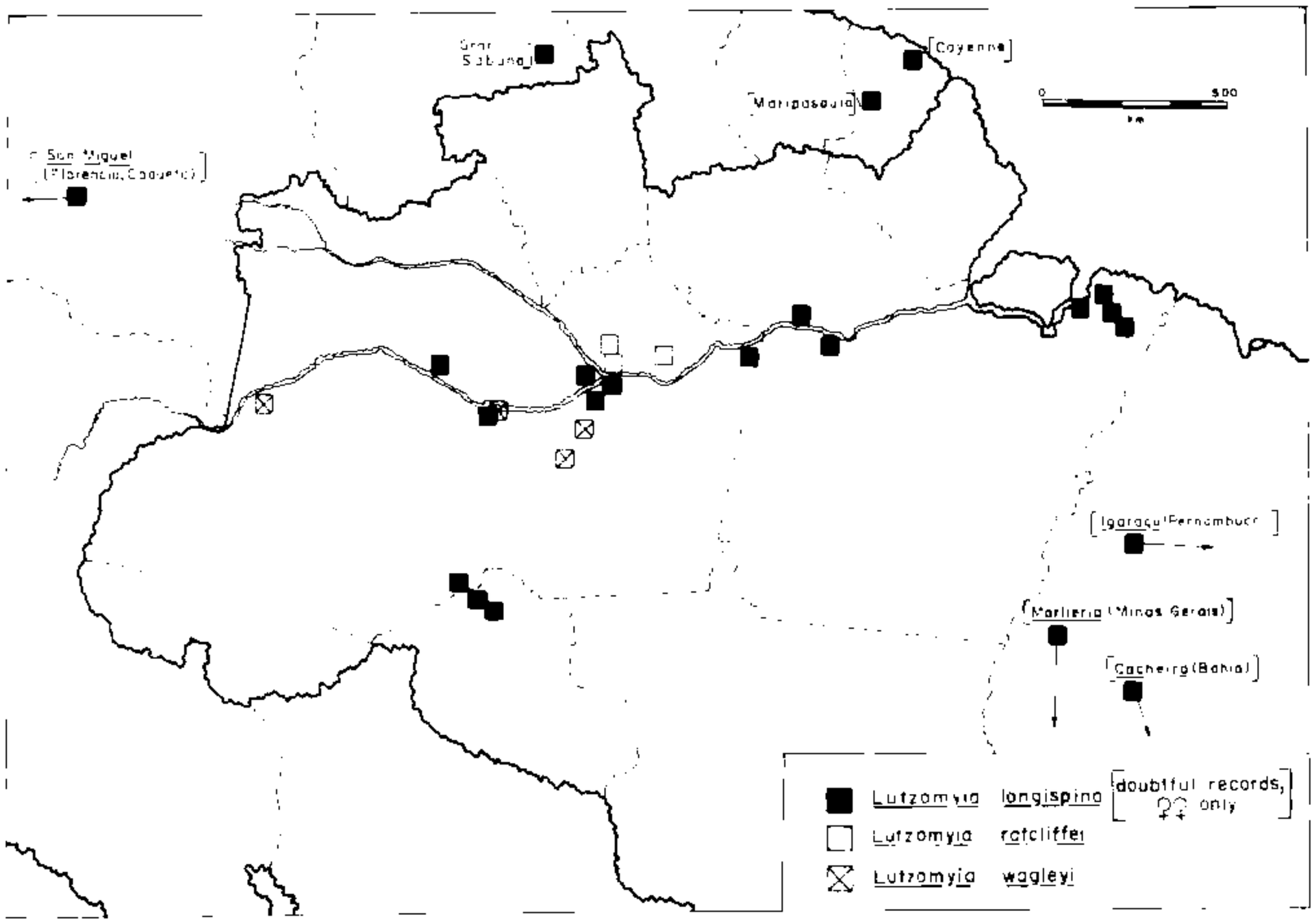
Discussion. Within the Amazon Basin this species has only been taken in lowland sites, where it is known to be sympatric with *L. dasipodogeton, L. rondoniensis* and *L. wagleyi.* The male of *L. longispina* is morphologically closest to those of *L. ratcliffei* and *L. wagleyi,* from which it can be separated on features of the parameres (Fig. 4). Records of this species based solely on females should be treated with caution as, judged by male characters, the females of *L. ratcliffei* and *L. wagleyi* are probably very similar. Intraspecific variation in size of *L. longispina* from different localities was noted.

Lutzomyia ratcliffei n.sp.
(Figs. 4 & 6; map 3)

Measurements outside the brackets refer to the holotype, within the brackets is the variation found in 5 paratypes.

Male. Wing length 2.00 (1.98-2.11); width 0.51 (0.58-0.59). Entire insect moderately pigmented, the pleura lighter than the nota. Head height from vertex to tip of

*Until all the ♀♀ of the subgenus have been described records not based on ♂♂, [ ], are best treated with caution.



Map. 3 - Known geographical distribution of *Lutzomyia longispina*, *L. ratcliffei* and *L. wagleyi*.

clypeus 0.33 (0.33-0.36) width 0.32 (0.31-0.33). Eyes separated by 0.126 (0.11-0.13) or by a distance equal to 7.0 (7.0-7.1) facet diameters. Interocular suture present at the sides. Flagellomere 1, 0.23 (0.26-0.27); ascoids simple, present on all flagellomeres except last two; tips of those on II ending before end of flagellomere. Labrum 0.19 (0.17-0.19) long. Length of palpal segments; 1, 0.034 (0.033-0.038); 2, 0.098 (0.093-0.11); 3, 0.14 (0.13-0.14); 4, 0.11 (0.091-0.11); 5, 0.33 (0.21-0.26); palpal sensillae present on the distal part of palp two and on the middle 1/3 of palp 3. Cibarium devoid of dotlike remnants of teeth, cibarial arch incomplete, no pigment patch present. Pharynx unarmed. Thorax 0.48 (0.47-0.50) long. Pleura with 20 (17-20) upper and 3 (3-4) lower mesanepisternal setae. Length of wing vein sections: *alpha* (0.49-0.54); *beta* (0.17-0.20); *delta* (0.030-0.055); *gamma* (0.26-0.29). Length of femora, tibiae and basitarsi: foreleg, 0.78 (0.78-0.82), 0.86 (0.85-0.92), 0.48 (0.46-0.48); midleg, 0.80 (0.75-0.80), 1.04 (1.04-1.11), 0.55 (0.52-0.56); hindleg, 0.86 (0.85-0.88), 1.28 (1.26-1.33), 0.65 (0.61-0.65). *Genitalia*. Style 0.22 (0.21-0.22) long with 4 major spines inserted on the distal 2/3 of segment; subterminal seta present. Coxite 0.31 (0.31-0.36) long without a persistent tuft of hairs but with a row of long hairs along the inner surface. Paramere bifurcate with a dorsal arm bearing long hairs on its dorsal surface, the distal part of the dorsal arm ending in a short tubular hairless projection bearing 3-6 hairs at the tip, and a thick subcylindrical basal arm bearing hairs on its dorsal surface. Aedeagus subtriangular with an acute tip, well pigmented. Genital pump 0.16 (0.16-0.18) long, each filament 0.43 (0.39-0.44) long or ca. 2.63 (2.37-2.67) X length of pump. Lateral lobe 0.44 (0.44) long. Cercus subtriangular as shown.

Female. Unknown.

Discussion. Of the hundreds of thousands of sand flies examined from the Manaus area (mostly from CDC light traps), fewer than 50 *Lutzomyia ratcliffei* have been taken. This species is sympatric with *L. trichopyga* in most of the localities where the former has been captured and with *L. dasipodogeton* at the Km 133 (Highway AM-010)

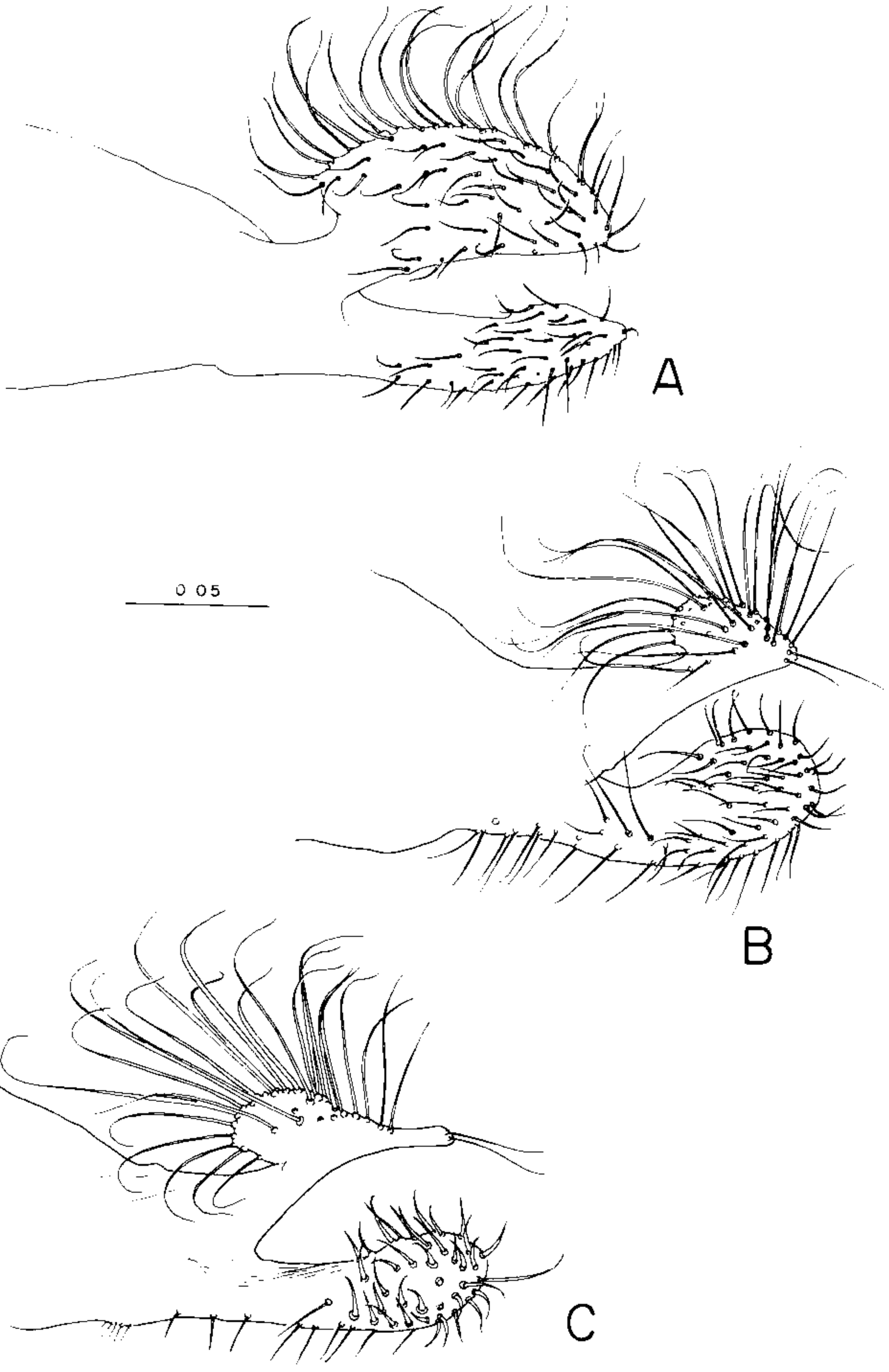


Fig. 4 – Parameres of: A, *Lutzomyia wagleyi*; B, *L. longispina* and C, *L. ratcliffei*.

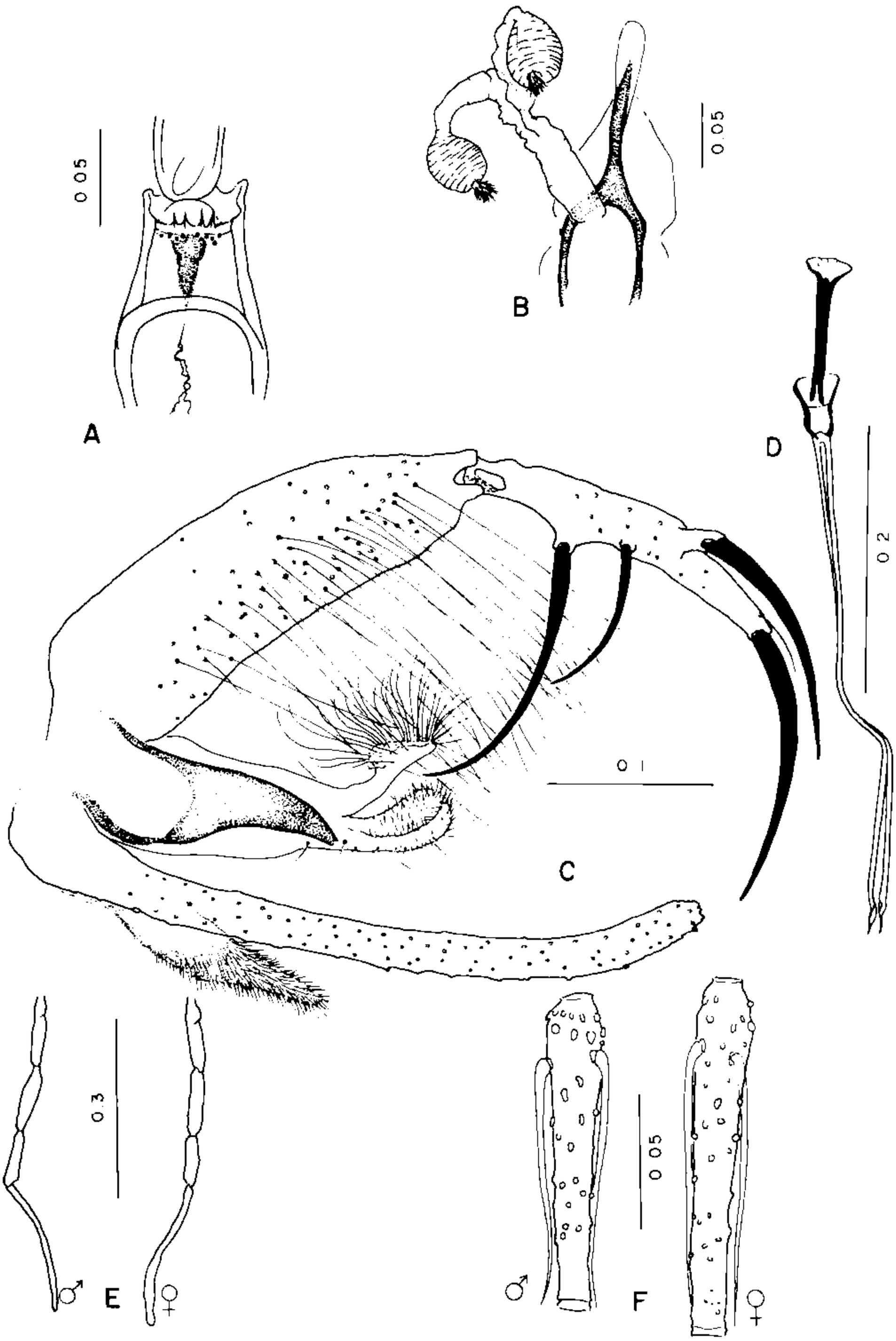


Fig. 5 – *Lutzomyia longispina:* A, ♀ cibarium; B, spermathecae with ducts; C, ♂ genitalia; D, genital pump with filaments; E, palps; F, flagellomere II.

locality. All of the females collected in all the study sites represent *L. trichopyga*, the males of which are found much more frequently than *L. ratcliffei*. We have not found any females, which we believe to be very close to the females of *L. longispina* and *L. wagleyi*.

The male of this species is very close to those of *L. longispina* and *L. wagleyi* but can be separated as previously discussed under *L. longispina* (Discussion).

L. ratcliffei was taken in low numbers throughout the year in CDC light traps set at 1 and 15 meters above the forest floor in "terra firme" forests, as well as in emergence traps set on "terra firme" forest floors.

Male Holotype, Brazil, Amazonas, Parque das Laranjeiras (Manaus), CDC-Contro B-1-1 25/06/1981. Arias et. al. coll. 7 ♂♂ paratypes, *Brazil,* Amazonas, Reserva Ducke, Km 26, Rodovia Torquato Tapajós (Highway AM-010) eclosion trap, various dates, 1978. J. Arias, R. Freitas & J. Vidal coll. 4 ♂♂ paratypes same as above but taken in CDC miniature light traps baited with dry ice and placed 1 meter above the forest floor, various dates 1977 & 1978; 19 ♂♂ paratypes, same as above, but taken at 15 mts above forest floor, in the tree canopy, various dates 1977 & 1978. 1 ♂ paratype Km 133 (Fazendas Unidas) of Highway AM-010, CDC light trap at 1 meter, 5/3/79 J. Arias, R. Freitas & J. Vidal coll. 1 ♂ paratype Cidade Nova (Manaus) animal (Armadillo) burrow, 15/8/82. R.N.L. Santos coll. 3 ♂♂ paratype Parque das Laranjeiras (Manaus) CDC light trap at 1 meter 6 to 8/81. 6 ♂♂ paratypes, same information but at 15 meters above the forest floor, Arias et al. coll. Holotype and two paratypes to be deposited in the Entomological collections of the Instituto Nacional de Pesquisas da Amazônia. Other paratypes to be deposited in Brazil: Museu Paraense Emilio Goeldi, Belém, Pará; Museu da Universidade de São Paulo, São Paulo; Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais and Instituto Oswaldo Cruz, Rio de Janeiro. Other paratypes to be deposited in: United States Natural History Museum, Washington, D.C.; University of Florida sand-fly Collection, Gainesville, Florida; British Museum of Natural History, London, England.

Material Examined. 39 ♂♂ from Amazonas State as cited above as type material.

This species is named in honor of Dr. Brett C. Ratcliffe who has done much work on the insects of the Amazon Basin, particularly in the Reserva Ducke (INPA) where most of the specimens were taken.

Lutzomyia rondoniensis Martins, Falcão & da Silva, 1965
(Fig. 7; map 2)

Lutzomyia rondoniensis Martins, Falcão & Silva, 1965 (♂ described from Abunã, Rondônia, Brazil). Forattini, 1973: 318 *et seq.* (gen. review, figs.). Ramirez-Perez et al., 1976: 602 (cf. to *conviti*). Martins et al., 1978: 114 (listed, distribution).

Distribution: Brazil — *Amazonas State:* Highway BR-319 (Manaus-Porto Velho) 275 kms. of Manaus, 8 ♂ CDC light trap, J. Arias et al. coll. *Rondonia State:* Abunã, 1 ♂ armadillo burrow (Martins et al. 1965: 14). BR-319 (Manaus – Porto Velho) Km 866, various ♂♂ CDC light traps at various heights, various dates 1979-1982 (Biancardi et al., 1982 and J.R. Arias et al., coll). BR-364 (Porto Velho – Vilhena) Kms. 8 & 48 (Cachoeira do Samuel), Ariquemes & Vilhena, same information (Ibid).

Material Examined. Over 75 ♂♂ from all the localities cited above as distribution records except for Guajará Mirim. Specimens were collected throughout year in CDC light traps placed at one and 6 meters above the forest floor.

Discussion. At present *Lutzomyia rondoniensis* has been taken only in the State of Rondônia and to a lesser extent along the BR-319 Highway in Amazonas State. The ♀ of this species has not yet been described; *Trichopygomyia* females collected in association

Fig. 6 – *Lutzomyia ratcliffei* n.sp.: A, flagellomere II; B, ♂ genitalia; C, palp.

with the males could be *L. dasipodogeton*, *L. longispina* or *L. wagleyi*, all of which are sympatric.

The males of *L. rondoniensis* and *L. conviti* are very similar, but can be separated by the shape of the aedegus (Figs. 1 & 7).

Specimens of this species show a wide variation in size, those from the Vilhena area have larger measurements than males from Km 275 (BR-319). The similarity of all the structures, particularly the paramere, indicate that all the specimens are conspecific.

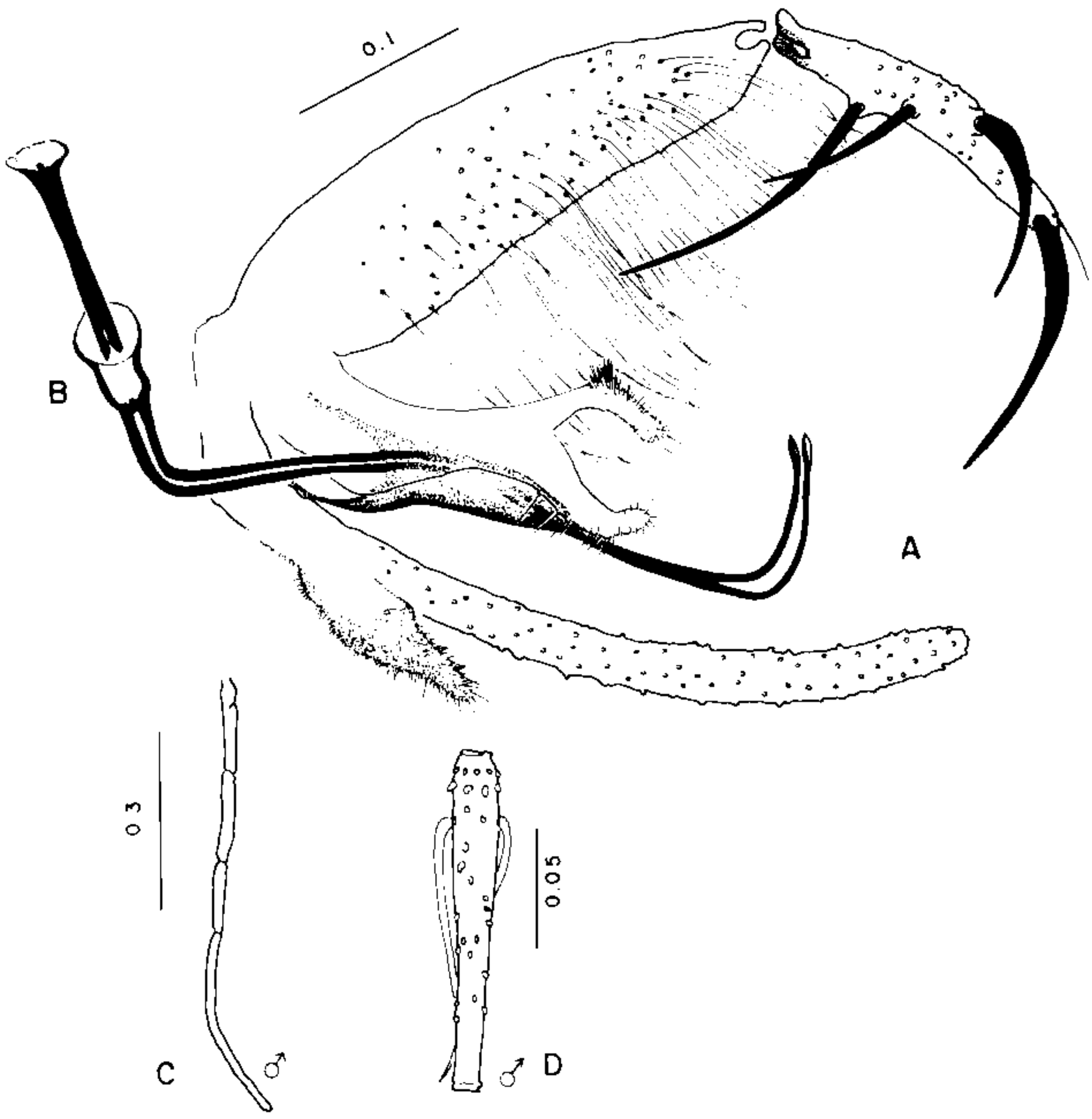


Fig. 7 - *Lutzomyia rondoniensis*: A, ♂ genitalia; B, genital pump with filaments; C, palp; D, flagellomere II.

Lutzomyia trichopyga (Floch & Abonnenc, 1945)
(Fig. 8; map 2)

Phlebotomus trichopygus Floch & Abonnenc, 1945:2-4, 11-12 (♂ ♀ described from Crique Anguille, French Guiana). Floch & Abonnenc, 1952:92-94 (♂ ♀ described). Fairchild & Hertig, 1952:518 (cf. to *triramulus*). Fairchild, 1955:195 (classified).

Lutzomyia trichopyga: Barretto, 1962:98 (classified). Theodor, 1965:190 (classified). Martins et al., 1965:14 (cf. to *rondoniensis*). Forattini, 1971:102 (classified). Forattini, 1973:320 *et seq.* (gen. review, figs.). Lewis, 1975:502 *et seq.* (mouthpart morph.). Ramirez-Perez et al., 1976:602 (cf. to *conviti*). Martins et al., 1978:113-114 (listed, distribution).

Distribution. Brazil – *Amapá Federal Territory:* Teresinha, 4 ♂♂, to light (Forattini, 1960:477). *Amazonas State:* Parque das Laranjeiras and AM-010 (Manaus – Itacoatiara) Kms 26, 30, 133 & 246, ♂♂ ♀♀ common in CDC light traps, various dates

1975-1982 (J.R. Arias et al. coll.). *Pará State:* near Monte Dourado, ♂♂♀♀ abundant in armadillo burrows, common in CDC light traps, various dates 1978-1981 (P.D. Ready & R. Lainson coll.); near Porto Trombetas ♂♂ ♀♀ abundant in armadillo burrows, April 1980 (P.D. Ready & R.P. Lane coll.). French Guiana – Crique Anguille, 12 ♂♂ 1 ♀ burrow (Floch & Abonnenc, 1945:4); near Cayenne, 1 ♂ Léger et al., 1977:218); Maripasoula, 20 ♂♂ 3 ♀♀ (Ibid); Haut Oyapock, 2 ♂♂ (Ibid).

Material Examined. Many ♂♂ ♀♀ from the regions of Manaus, Monte Dourado (0° 47'S, 52°40'W) and Porto Trombetas (1°27'S, 56°24'W). Sexes associated by laboratory-rearing of individual egg broods (10) laid by naturally engorged ♀♀ caught in an armadillo burrow near Monte Dourado, August 1979.

Discussion. Lutzomyia trichopyga is known to be sympatric with *L. dasipodogeton* and *L. ratcliffei* near Manaus and sympatric with *L. dasipodogeton* near Monte Dourado. In both areas, it is the most commonly captured species of *Trichopygomyia.* Floch & Abonnenc (1952:94) refer to the female as having six strong horizontal teeth in the cibarium. This accords with their figure (27) which is a reproduction of that (Fig. 2) given with the original description of the type female (Floch & Abonnenc, 1945:12). However, the text of the original description refers to four strong horizontal teeth. Brazilian specimens always have but four horizontal teeth. Unfortunately, we have not examined material from Fr. Guiana but believe that the cibarium figured for the type female is aberrant, since Brazilian material agrees with the original descriptions in all other characters.

Lutzomyia triramula (Fairchild & Hertig, 1952)
(Fig. 9)

Phlebotomus triramulus Fairchild & Hertig, 1952:517-519 (♂ ♀ described from Rio del Medio and Cerro Jefe respectively, Panama).

Lutzomyia triramula see Young 1979:123 (full references). Martins et al., 1978:11 (listed, distribution).

Distribution. Belize – various localities: 51 ♂♂, 23 ♀♀ light trap & oil trap (Williams, 1970). Colombia – *Antioquia:* Rio Anori 108 ♂♂, 94 ♀♀ light & flight traps various dates, 1970 (Young, 1979). *Choco:* Alto Curiche, 4 ♂♂, 19 ♀♀ July – Nov. 1967 (Ibid.); Curiche 111 ♂♂, 237 ♀♀ light, malaise & Shannon traps various dates 1967, (Ibid.); Teresita 1 ♂ tree trunk June 1967; 1 ♂ light trap Oct. 1967 (Ibid.). *Santander*: S. Vicente do Chucuri 2 ♂♂ in tree hollow associated with bats 17-8-1944 (Sherlock, 1962). *Valle*: Taparalito (Rio Raposo) 22 ♂♂ 23 ♀♀ light baited Shannon trap, from 1959-1969 (Barreto, 1969); 25K E of Buenaventura 1 ♂, 2 ♀♀ tree trunk 1973 (Young 1979); same locality 5 ♂♂, 13 ♀♀ light trap 1973 (Ibid). Panama – *Canal Zone:* Barro Colorado Is., Camp Chagres, Empire Range, Gatum, Howard, Kobe, Limbo Field Station, Mojinga, Swamp & Sherman, 1000 +♂♂ 1000 +♀♀ in tree butress, light traps, Shannon traps, tree hollows & primarily animal burrows, various dates 1944 – 1973 (Chaniotis & Correa, 1974; Chaniotis et al., 1971, 1972; Fairchild & Hertig, 1952; Rutledge et al., 1975, 1976). *Colon:* Cacique, Cerro Santa Rita, Palenque, Rio del Medio, ♂♂♀♀ light traps, tree bases, and mostly in animal burrows (Fairchild & Hertig, 1952). *Panama:* Camp Chorrera, Campana, Cerro Azul, La Victoria (Near Pacora) same information (Fairchild & Hertig, 1952; Herrer & Christensen, 1976).

Material Examined. 2 ♂♂ & 2 ♀♀, Colombia, Antioquia, Rio Anori, 24 Km SW of Saragaza, light trap, all on 22 Sept. 1970, except one ♂ on 15 Sept., 1970, D.G. Young coll.

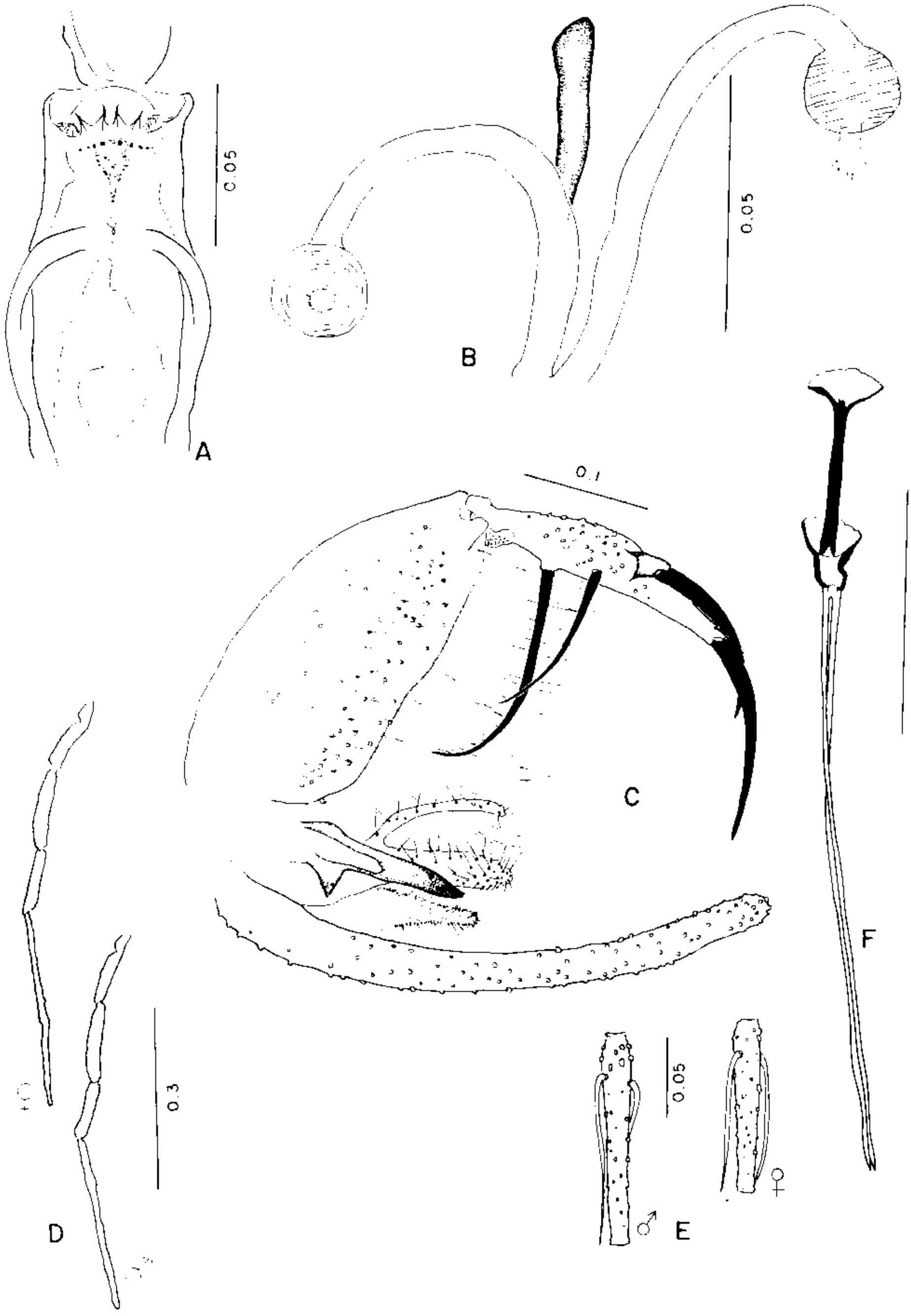
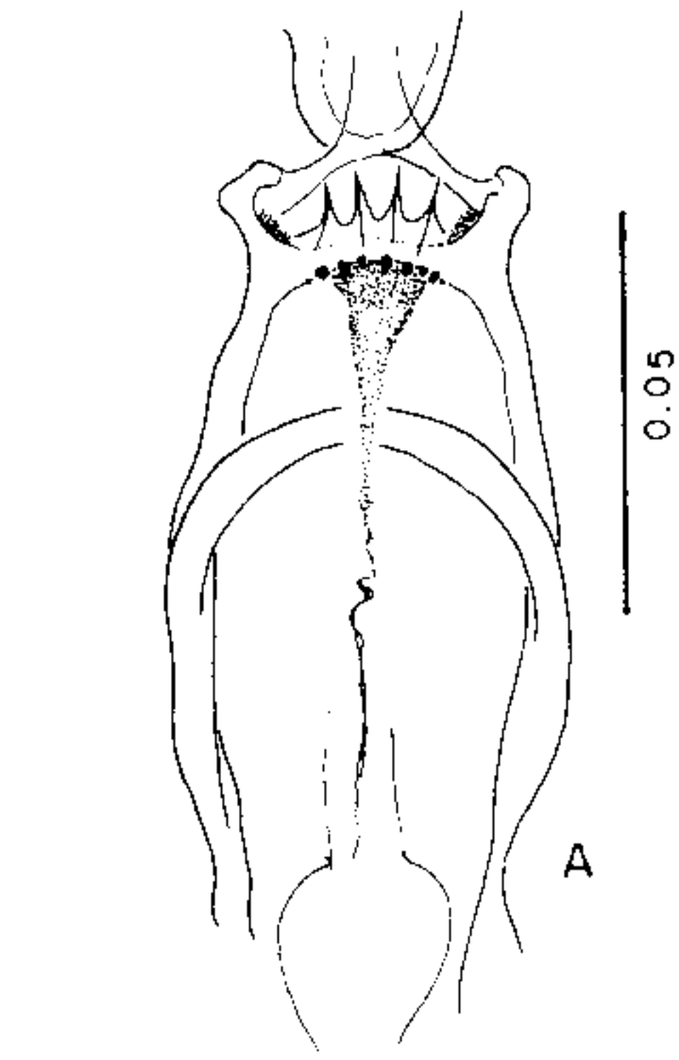
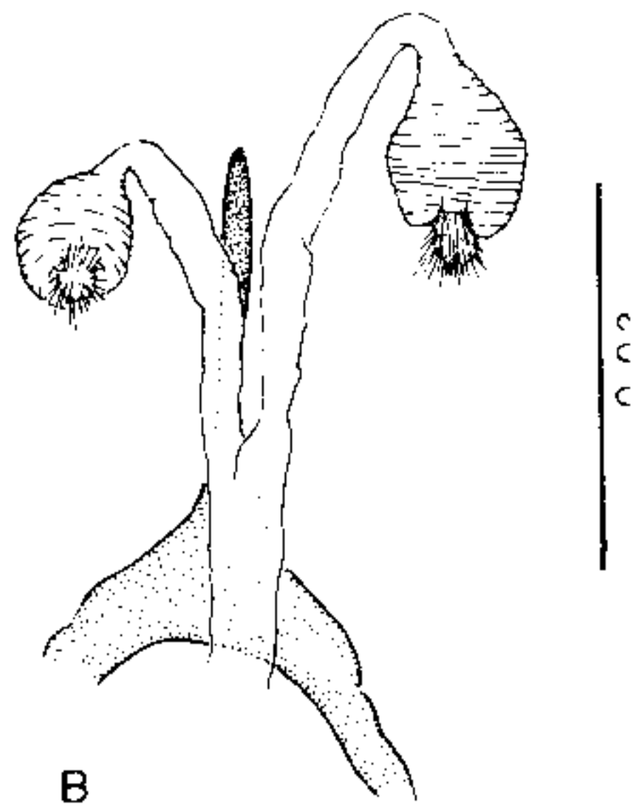
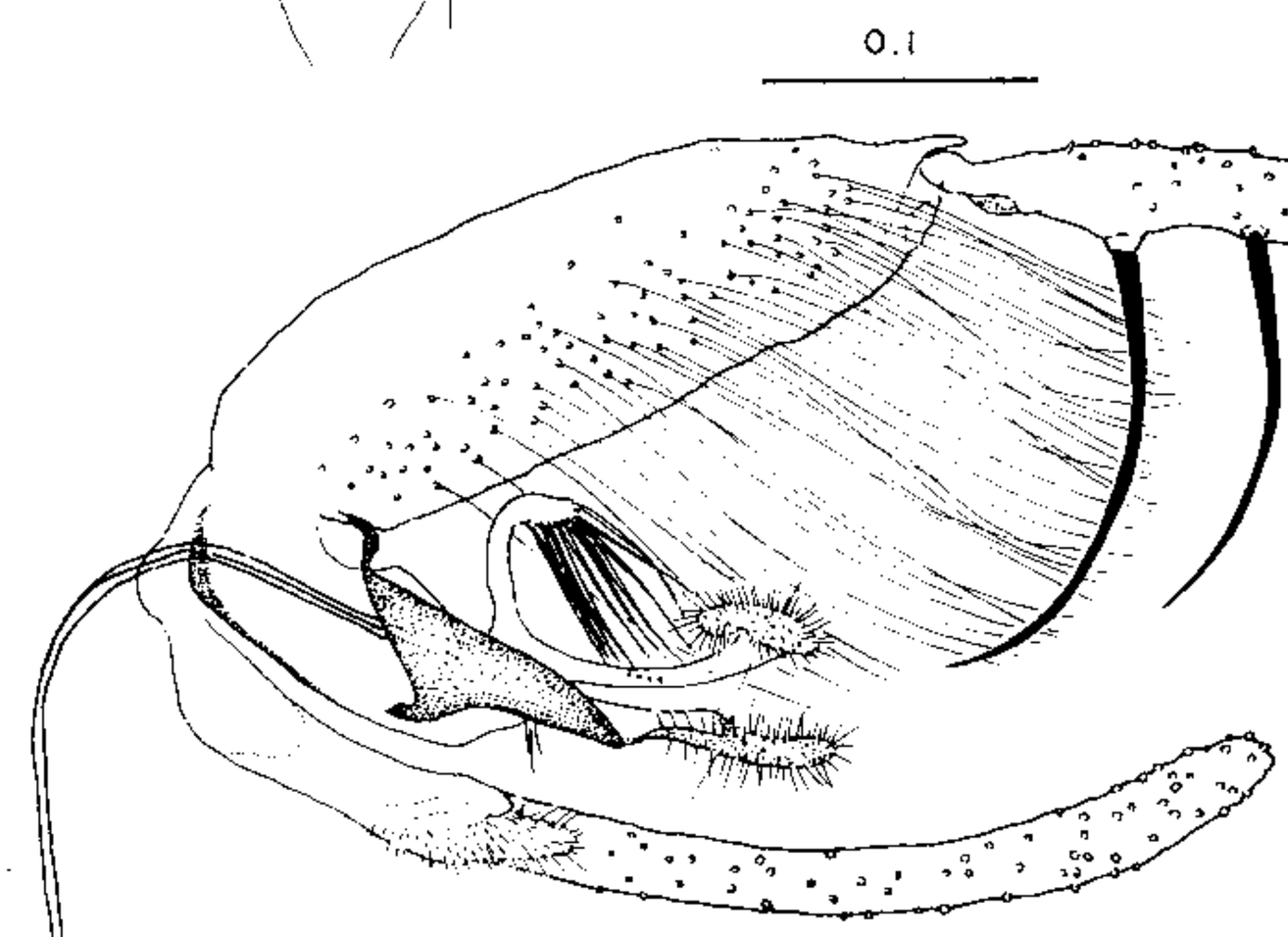


Fig. 8 *Lutzomyia trichopyga*: A, ♀ cibarium; B, spermathecae with ducts; C, ♂ genitalia; D, palps; E, flagellomere II; F, genital pump with filaments.







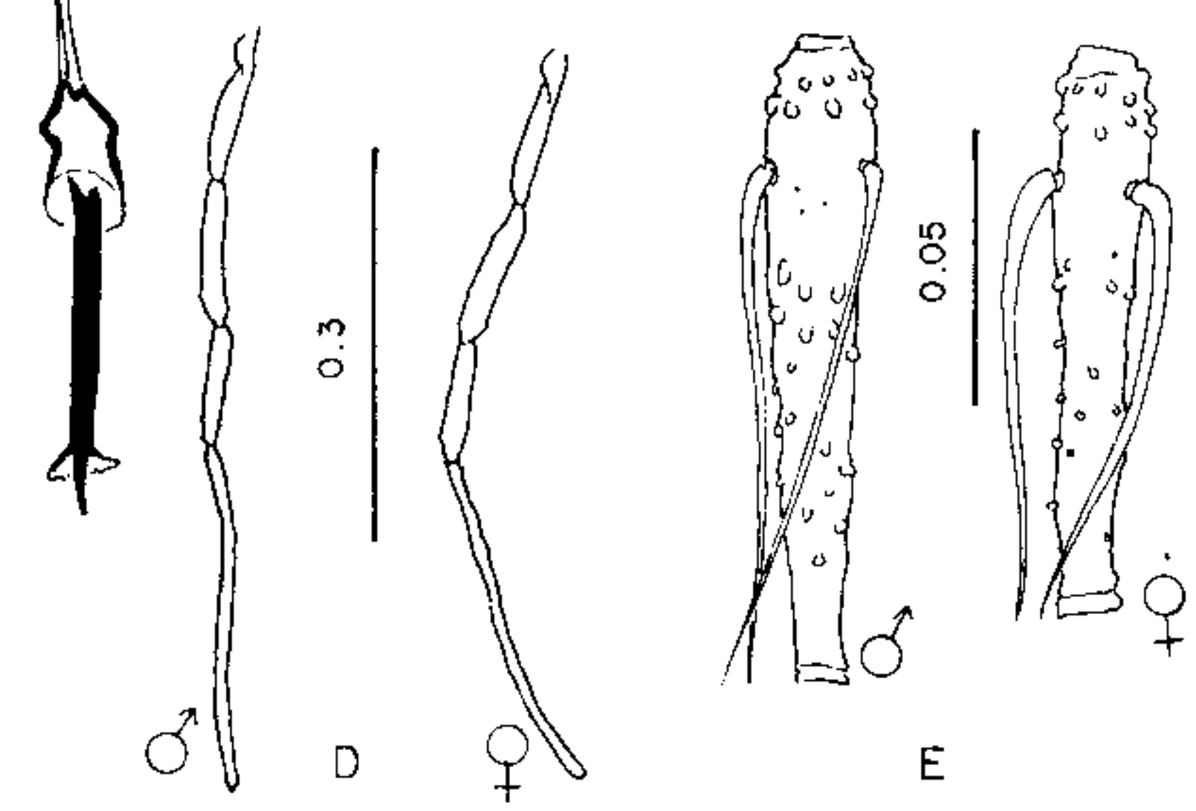


Fig. 9 – *Lutzomyia triramula*: A, ♀ cibarium; B, spermatheeae with ducts; C, ♂ genitalia; D, palps; E, flagellomere II.

Discussion. This is the only species in the subgenus that is found in Central America. Young (1979) found structural variations in parameres of specimens from different localities but considered it to be intraspecific variation.

Lutzomyia wagleyi (Causey & Damasceno, 1945)
(Fig. 4, 10; map 3)

Flebotomus wagleyi Causey & Damasceno, 1945:25-29 (♂ holotype described from São Paulo de Olivença, Amazonas).

Phlebotomus wagleyi: Floch & Abonnenc, 1952:33 (♂, keyed). Fairchild & Hertig, 1952:518 (cf. to *triramulus*). Fairchild, 1955:195 (classified).

Lutzomyia wagleyi: Barretto, 1962:98 (classified). Martins et al., 1965:14 (cf. to *rondoniensis*). Theodor, 1965:190 (classified). Forattini, 1971:102 (classified). Forattini, 1973:325 *et seq.* (gen. review, figs.). Martins et al., 1978:115 (listed, distribution). Morales & Minter 1981:101 (♀ described).

Distribution. Brazil – *Amazonas State:* Coari, 169 ♂♂ in armadillo burrows, various dates 1942-45 (Damasceno et al. . 1949:834, 842); São Paulo de Olivença, 1,069 ♂♂, same information (Ibid.); BR-319 (Manaus – Porto Velho) Km 275, 2 ♂♂ May 1978 and 1 ♂ July 1981 in CDC light traps 6 m above forest floor (J.R. Arias et al., coll.); BR-319, Km 400, 1 ♂ as before, October 1978 (Ibid). Colombia – *Caqueta State:* Araracuara 2 ♂♂, 6 ♀♀ light trap, 1-20 July 1977 (Morales & Minter, 1981:101).

Material Examined. 4 ♂♂ BR-319 (Manaus – Porto Velho) 275 Km of Manaus, 1978 & 1981.

IDENTIFICATION

There are many *Lutzomyia* species whose males have a style which bears four major spines inserted at different levels and a small subterminal seta. *Trichopygomyia* species, however, are unique, in combining this character with: a bifurcate or trifurcate paramere, and a coxite which bears a ventral fringe of long hairs but no discrete patch of setae (and no tubercle). The spermathecae are characteristic for the subgenus. Morphometric measurements of the various species show a great deal of overlap as can be seen in Table I. Species differentiation by these characters is unreliable.

TABLE I

Measurements (in mm) of various structures of males of the subgenus *Trychopygomyia*

Species	*1 st flagellomere*	*Lateral lobe*	*Coxite*	*Sperm pump*	*Genital filaments*	*Genital filaments / Sperm pump*
Lutzomyia conviti	0.26	0.45	0.36	0.16	0.49	3.0
L. dasipodogeton	0.25-0.28	0.46-0.48	0.37-0.39	0.17-0.18	0.47-0.51	2.8
L. elegans	0.26-0.27	0.45-0.47	0.34-0.36	0.16-0.17	0.43-0.46	2.6-2.8
L. longispina	0.22-0.28	0.43-0.47	0.29-0.35	0.16-0.19	0.41-0.47	2.2-2.7
L. ratcliffei	0.23-0.27	0.44	0.31-0.36	0.16-0.18	0.39-0.44	2.3-2.7
L. rondoniensis	0.23-0.33	0.44-0.47	0.31-0.35	0.16-0.17	0.44-0.51	2.7-3.1
L. trichopyga	0.24-0.28	0.42-0.45	0.30-0.33	0.15-0.16	0.42-0.45	2.7-3.0
L. triramula	0.23-0.24	0.39-0.40	0.29-0.34	0.14-0.15	0.40-0.41	2.7-2.9
L. wagleyi	0.23-0.26	0.44-0.46	0.32-0.34	0.16-0.19	0.39-0.49	2.4-3.0

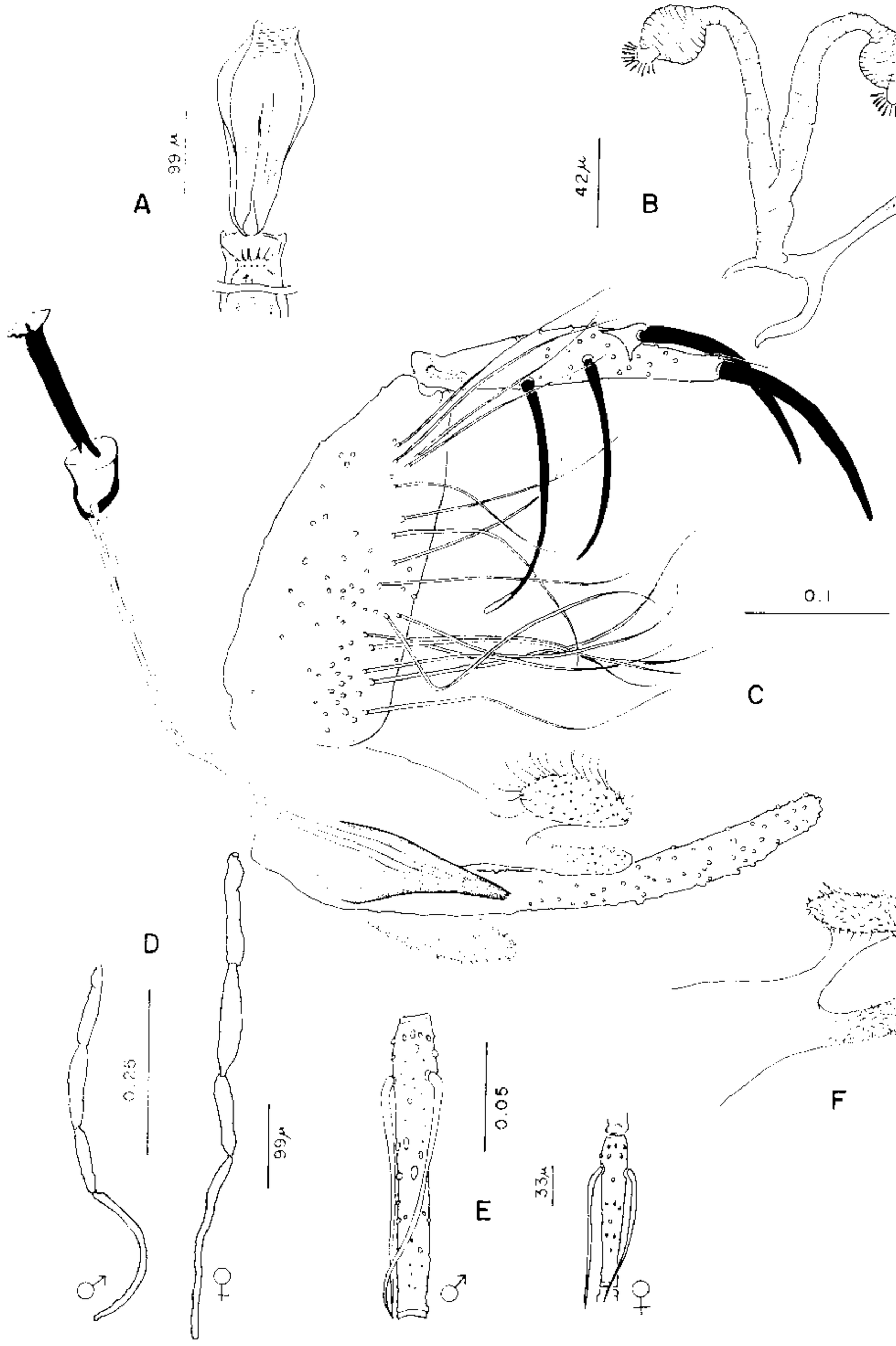


Fig. 10 – *Lutzomyia wagleyi:* A, ♀ cibarium; B, spermathecae with ducts; C, ♂ genitalia; D, palps; E, flagellomere II; F, paramere (all ♀ structures after Morales & Minter, 1981).

KEY TO THE MALES OF *TRICHOPYGOMYIA*

1. Paramere trifurcate 2
   Paramere bifurcate. 3

2. Medial lobe of paramere subequal to the basal lobe . . . . . *L. triramula* (Fig. 9)

   Medial lobe of paramere reduced to a small protuberance, smaller than the basal lobe. . . . . *L. elegans* (Fig. 3)

3. Aedeagus with large dorsal, reclined, lobular projection; dorsal arm of paramere less than half length of ventral arm. . . . . *L. dasipodogeton* (Fig. 2)

   Aedeagus usually without dorsal projection (if present, only a mound); dorsal arm of paramere subequal in length to ventral arm. 4

4. Paramere wrench shaped (Figs. 1,7) 5
   Paramere otherwise 6

5. Dorsal mound on aedeagus present . . . . . *L. conviti* (Fig. 1)

   No dorsal mound on aedeagus . . . . . *L. rondoniensis* (Fig. 7)

6. Dorsal arm of paramere slender, uniform in size throughout . . . . . *L. trichopyga* (Fig. 8)

   Dorsal arm of paramere enlarged distally 7

7. Dorsal arm of paramere not markedly tapering distally . . . . . *L. wagleyi* (Figs. 4 & 10)

   Dorsal arm of paramere markedly tapering distally. 8

8. Distal end of dorsal arm of paramere tubular with a few fine hairs protruding from tip . . . . . *L. ratcliffei* n. sp. (Figs. 4 & 6)

   Distal end of dorsal arm of paramere not tubular, setae on tip uniformly distributed. . . . . *L. longispina* (Figs. 4 & 5)

KEY TO THE FEMALES OF *TRICHOPYGOMYIA*

1. Length of individual sperm duct not more than two times that of common duct 2

   Length of individual sperm duct at least four times that of common duct 3

2. Length of common sperm duct less than two times the width of the spermatheca . . . . . *L. longispina* (Fig. 5)
   L. wagleyi (Fig. 10)

Length of common sperm duct more than twice the width of the spermatheca	*L. triramula* (Fig. 9)
3. Common sperm duct conspicuous, at least 1/4 the length of the individual duct	*L. elegans* (Fig. 3)
Common sperm duct inconspicuous or very short	4
4. Length of individual sperm duct not more than three times the length of the spermatheca	*L. dasipodogeton* (Fig. 2)
Length of individual sperm duct about five times the length of the spermatheca	5
5. Cibarial arch complete	*L. conviti* (Fig. 1)
Cibarial arch conspicuous only at sides	*L. trichopyga* (Fig. 8)

All species are generally light brown in colour, but the head and mesonotum are usually perceptibly darker than other parts.

The females of *L. ratcliffei,* at present unknown, probably have spermathecae very similar to those of *L. longispina.* Similarly (based on male likeness), the spermathecae of *L. rondoniensis* would be expected to have long individual sperm ducts and an inconspicuous common sperm duct, like those of *L. conviti.*

Ecology

Trichopygomyia species seem to share the same broad ecological niche, all being largely sylvatic, terrestrial and associated with armadillos and other burrowing mammals. The type descriptions of seven species are based on material caught in armadillo burrows (6 species) or a "burrow" (*L. trichopyga*); the exceptions are *L. ratcliffei,* of which little is known, and *L. triramula,* paratypes of which were caught in animal burrows. Excepting the less well known species, all have been taken (frequently) in light traps and from tree bases, but the largest populations have been encountered in armadillo burrows and, to a lesser extent, in rodent burrows (*Cuniculus* spp.) (Damasceno et al., 1949; Fairchild & Hertig, 1952; Ready & Lainson, unpublished observations). Christensen & Vasquez (1982) found both sexes of *L. triramula* to be common on tree bases above animal burrows in Panama; the host of 57/75 blood-engorged females of this species was identified as armadillo. In Pará State, Brazil, the armadillo *Dasypus novemcinctus* is commonly infected by a form of *Leishmania braziliensis* s.l. (Lainson et al., 1979). Infected armadillos were encountered in a "terra firme" forest near Monte Dourado, and *L. trichopyga* was found to be abundant in occupied burrows (Lainson et al., 1979; Ready & Lainson, unpublished observations). *Trichopygomyia* species have yet to be associated with different armadillo species, but such a means of isolation seems likely. It is interesting to note that *L. longispina* and *L. wagleyi* have been taken most frequently in lowland areas were soils are generally moist, whereas *L. dasipodogeton* is as common in highland areas.

RESUMO

O subgênero *Trichopygomyia* Barretto, 1962 do flebótomo *Lutzomyia* spp. França, 1924 é revisto e corresponde às espécies incomuns do grupo *longispina* de Theodor (1965). É também descrita *Lutzomyia* (*Trichopygomyia*) *ratcliffei* n.sp. da Bacia Amazônica. Figuras, chaves, mapas de distribuição e notas sobre ecologia são apresentados para todas as formas conhecidas. As espécies mais conhecidas são freqüentemente encontradas em tocas de tatu e, portanto, podem ser vetores de *Leishmania*.

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